



US LHC Accelerator Research Program ***brookhaven - fermilab - berkeley***

Objectives of the Collaboration Meeting

US LARP Collaboration Meeting
Port Jefferson
16-18 September 2003

J. Strait
Fermilab



Meeting Objectives

- **Major Objective: Develop the detailed plan for FY2004.**
 - Specific work plan for each subprogram.
 - Modify, if necessary, division of \$ among subprograms and labs.
 - FY2004 plan developed in context of planning for FY2005-06.
 - Follows from plan sketched in the Proposal.
- **Secondary Goals**
 - Address recommendations from June Lehman Review.
 - Start to exercise the management systems sketched in the Proposal.
 - Consider whether and how to expand the collaboration.



Accelerator Systems Cost OVERVIEW

		FY04	FY05	FY06	FY07	FY08	FY09
Labor Count	FTE	2.6	7.1	14.6	18.0	17.2	15.4
Labor Cost	\$k03	502	1314	2410	2910	2676	2380
Travel	\$k03	27	74	146	185	169	154
Materials & Services	\$k03	90	330	760	865	690	690
TOTAL COSTS (escalated)							
Instrumentation	\$k	300	744	1,733	2,048	1,953	1,897
Beam Comm & Acc Phys	\$k	227	570	1,366	1,896	1,895	1,952
Hardware Commissioning	\$k	111	509	525	512	249	0
GRAND TOTAL	\$k	638	1,823	3,623	4,457	4,098	3,850
Guideline	\$k	635	1,820	3,620	4,460	4,100	3,840

Travel budget allows \$10k/yr for each FTE

Burdens are included in travel and M&S costs shown



Instrumentation OVERVIEW

		FY04	FY05	FY06	FY07	FY08	FY09
Labor count							
Tune feedback	FTE	.5	.5	1.6	1.8	1.0	.0
Luminosity monitor	FTE	.6	1.4	2.4	1.8	1.0	.0
Longitudinal density monitor	FTE		.5	1.6	2.5	2.4	1.0
Additional Instrumentation	FTE				.4	2.3	4.9
Materials & Services							
Tune feedback	\$k03	40	70	180	180	50	0
Luminosity monitor	\$k03	40	150	300	250	100	0
Longitudinal density monitor	\$k03		40	200	300	200	50
Additional Instrumentation	\$k03				70	300	600
Labor cost	\$k03	202	424	860	960	976	880
Travel	\$k03	10	17	46	60	59	59
Materials & Services	\$k03	80	260	680	800	650	650
TOTAL COST							
Constant dollars	\$k03	292	701	1,586	1,820	1,685	1,589
3.00%	\$k	300	744	1,733	2,048	1,953	1,897



BC&AP cost overview

		FY04	FY05	FY06	FY07	FY08	FY09
BEAM COMMISSIONING							
Labor count	FTE	.5	1.6	4.0	6.5	6.5	6.5
Cost sub-totals							
Labor	\$k03	100	270	650	1,050	1,000	1,000
Travel	\$k03	5	16	40	65	65	65
FUNDAMENTAL ACCELERATOR PHYSICS							
Labor count	FTE	0.5	1.1	3	3	3	3
Cost sub-totals							
Labor	\$k03	100	220	500	500	500	500
Travel	\$k03	5	11	30	30	30	30
TOTAL COST							
Not escalated	\$k03	220	537	1,250	1,685	1,635	1,635
3.00%	\$k	227	570	1,366	1,896	1,895	1,952



Hardware Commissioning

		FY04	FY05	FY06	FY07	FY08	FY09
Labor count							
At a U.S. Lab	FTE	.5	.5				
At CERN	FTE		1.5	2.0	2.0	1.0	
Scientist/Engineer	FTE	.5	2.0	2.0	2.0	1.0	
Labor count	FTE	.5	2.0	2.0	2.0	1.0	.0
Labor cost	\$k03	100	400	400	400	200	0
Travel	\$k03	8	30	30	30	15	0
Materials & Services	\$k03		50	50	25		
TOTAL COST							
Not escalated	\$k03	108	480	480	455	215	0
3.00%	\$k	111	509	525	512	249	0



Magnet Program Profile

		FY04	FY05	FY06	FY07	FY08	FY09	FY10
Subscale Tests		1	3	6	5	4	3	2
Simplified 1m Q				1	1			
1m Q					1	2	2	2
1m D					1	1	1	1
4m D or Q models							0.25	1

24 Sub-Scale tests

2 Simplified models

7 Quad models

4 Dipole models

1 4 m model



Solid technology development base
complemented by a series of models
of varying complexity

Slow start is a problem

Can Base Programs help?

June 10, 2003

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S. Gourlay



Magnet R&D Cost Overview

	FY04	FY05	FY06	FY07	FY08	FY09
LABOR COUNT	1.6	5.5	21.0	20.0	20.6	20.7
LABOR COST	288	940	3168	3064	3152	3148
TRAVEL	6	18	41	42	43	42
MATERIAL & SERVICES	20	358	2920	2091	3010	3021
TOTAL COSTS	314	1315	6128	5196	6205	6210
Escalated	323	1395	6697	5849	7193	7415
Guideline	325	1400	6695	5845	7185	7425

Travel budget allows \$5k/yr per scientist and engineer

June 10, 2003

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S. Gourlay



FY2004 Budget Submitted to DOE

July 2003

Program Total	1050	Acc Syst	637
BNL	330	BNL	203
FNAL	329	FNAL	185
LBNL	391	LBNL	249
Acc Syst	637	Instrumentation	300
BNL	203	BNL	69
FNAL	185	FNAL	69
LBNL	249	LBNL	162
Magnet R&D	325	Acc Phys	227
BNL	105	BNL	101
FNAL	100	FNAL	72
LBNL	120	LBNL	54
Pgm Mgmt	88	Hdw Comm	110
BNL	22	BNL	33
FNAL	44	FNAL	44
LBNL	22	LBNL	33

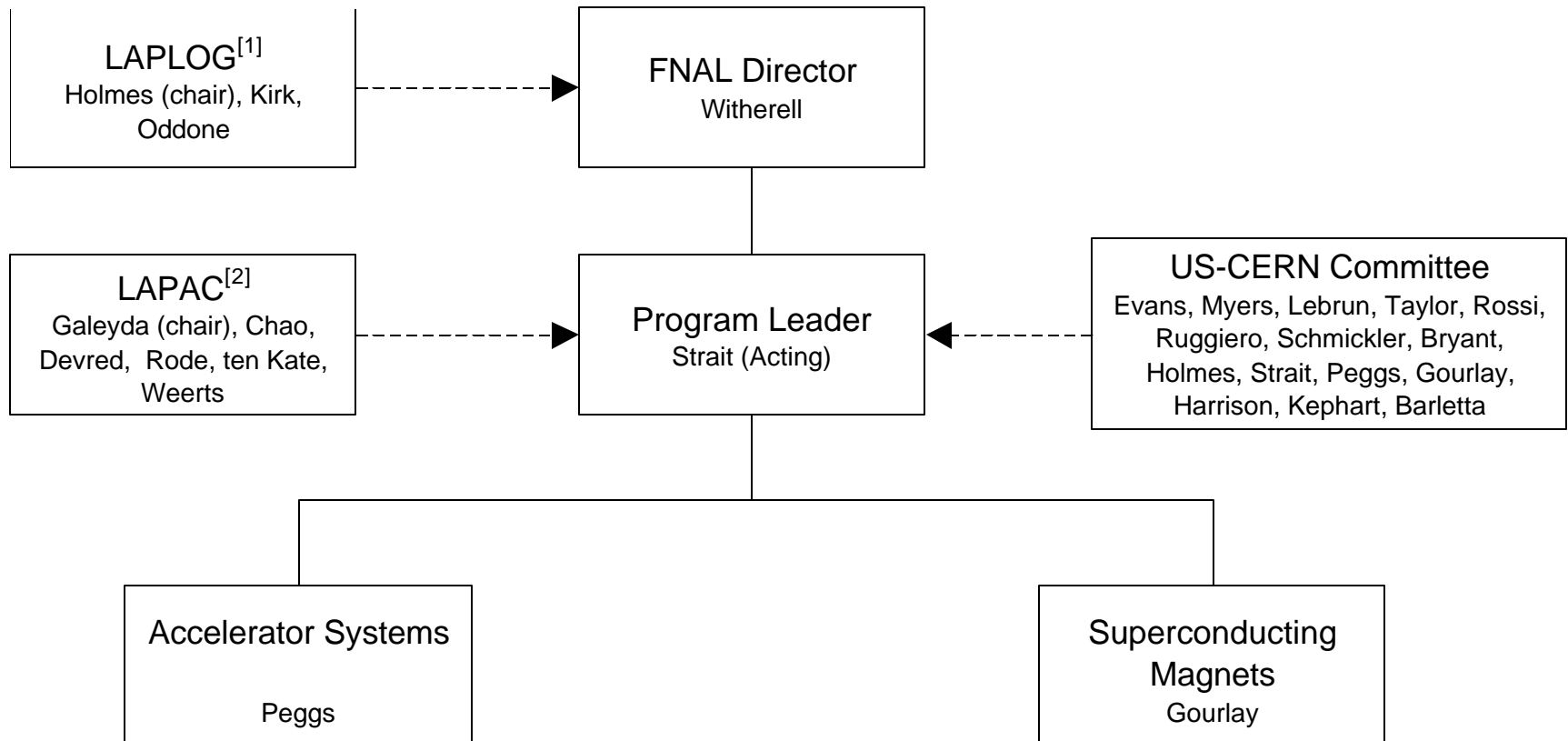


Developing the FY2004 Plan

- Sessions need plenty of time for discussion
... this is a **work**shop, not a conference.
 - Explicit time is left for each subprogram to develop its FY2004 plan.
 - May need time for broader discussion if proposals to move \$ between subprojects are floated.
- Result should be a **written** plan for FY2004.
 - Submitted to me through AccSys and Magnet R&D leaders.
 - Clear statement of work for FY2004 and of resource distribution.
 - Specific enough so we can tell how we did relative to the plan.
 - Include plans, at appropriate level of detail, for FY2005-06 as well.
 - Draft at end of meeting, final version in ~1 week.
- Need to repeat this process for FY2005 on DOE budget planning cycle: => ~**February 2004**.



Advisory Committees





Involvement of Advisory Committees

- Executive Committee (US part of US-CERN Committee).
 - Has “blessed” FY2004 budget submitted to DOE.
 - Would need to be consulted if this meeting proposes redistribution of funds. (Most members present at this meeting.)
- US-CERN Committee.
 - CERN has requested a video teleconference in about 2 weeks to review the outcome of this meeting.
 - To be scheduled
(First choice Wednesday 1 October – 17:00/11:00/10:00/08:00)
- LAPAC
 - When is the appropriate time for them to review us?
- LAPLOG
 - Advises Mike Witherell. No meetings scheduled yet.



DOE Review Recommendations

Accelerator Systems

1. DOE should approve the proposal taking into account these comments and recommendations.
2. DOE should review the detailed work plan for FY 2004 and the planning for FY 2005 by August 2003.
3. Develop a management plan for the beam commissioning studies during FY 2004.
4. The instrumentation and beam commissioning groups should invite participation from outside the three primary laboratories in the LARP collaboration to staff these programs with the best personnel and bring these people into the U.S. HEP program.
5. Develop a mechanism for soliciting, reviewing, and selecting proposals for instrumentation and LHC upgrades.



DOE Review Recommendations

Magnet R&D

1. DOE should review the program one year after start of funding by an external review committee with the purpose to better define project goals and deliverables based on work accomplished in the first year.
2. DOE should request the LARP team to specifically address early in the program how the magnet design effort will be organized, and create the mechanisms to ensure that these design efforts drive the priorities of the R&D program.
3. Create the review mechanisms, either by DOE or LARP itself, to ensure that technical activities are not duplicated at different laboratories.
4. Define a formal structure by which tasks can be redefined and work (and supporting resources) reallocated among the laboratories based on the most successful research results and changing programmatic priorities.



DOE Review Recommendations

Magnet R&D (continued)

5. Develop a process by which universities can contribute to this program and be proactive in informing that community about the program needs. This should be done by the end of this calendar year.
6. DOE should review by August 2003 a detailed work plan of activities for FY 2004 that includes the preparation of more definitive work packages for FY 2005 and beyond.
7. DOE should approve this program as proposed taking into account the comments and other recommendations as noted.



DOE Review Recommendations

Cost and Schedule

1. Maintain a rigorous systematic process across the U.S. LARP program for **consistently developing, evaluating, and monitoring cost and schedules estimates** used to plan and execute program activities.

Management

1. Proceed with the full implementation of the management structure proposed including **formal definitions of the roles and responsibilities of the line organization and the various advisory bodies by the end of this calendar year.**
2. Develop additional strategies for **increasing outreach with universities and other laboratories** by the end of the end of this calendar year.
3. **Prepare a description of the scope of work for FY 2004 by July 11, 2003.**



Appendix – FY2004 Budget Submitted to DOE

Subject: LARP FY2004 Funding
From: James Strait <strait@fnal.gov>
Date: Wed, 30 Jul 2003 17:01:01 -0500
To: Moishe Pripstein <Moishe.pripstein@science.doe.gov>
CC: Bruce Strauss <Bruce.Strauss@science.doe.gov>, Jim Yeck <Jim.Yeck@ch.doe.gov>

Moishe,

Here, almost a week later than I promised, is my funding proposal for the three labs for LARP for FY2004, including requests at three different levels - \$1050k corresponding to the current funding guidance, \$1250k corresponding to the funding guidance prior to February, and \$1821k corresponding to the level we think it "ought" to be, as documented in our "enhanced" proposal of 6 June 2003.

When (and where) can I call you on Thursday (or later today)?

Jim



Moishe,

The table below summarizes our funding request for the US LHC Accelerator Research Program (LARP) for FY2004, for inclusion in the October 2003 Financial Plan. As we discussed last week, we are providing information at three funding levels. The first corresponds to the current official funding guidance of \$1050k, and is the program that we presented in our Proposal. The second is a supplementary request of \$200k, corresponding to the funding guidance before February 2003. The third is for funding of \$1821k, which corresponds the (draft) proposal for an enhanced program that we submitted shortly before the June Lehman Review. In each column, I show the amount allocated for each of the three collaborating National Laboratories for each of the major program elements. Below, I give some details of the FY2004 program at each funding level.

	Proposal	Add \$200k	"Enhanced" Proposal
Program Total	1050	1250	1821
BNL	330	411	542
FNAL	329	414	570
LBNL	391	425	709
Accelerator Systems	637	699	1082
BNL	203	234	309
FNAL	185	216	297
LBNL	249	249	476
Magnet R&D	325	463	600
BNL	105	155	200
FNAL	100	154	200
LBNL	120	154	200
Program Management	88	88	139
BNL	22	22	33
FNAL	44	44	73
LBNL	22	22	33

The Accelerator Systems program at the \$1050k funding level provides \$300k for beam instrumentation. This will support the continued design and development of the Luminosity Monitor, principally by LBNL, following the beam test that will be performed near the end of FY2003. Activities on a Tune Measurement and Feedback system will begin at BNL and FNAL, seeking to capitalize on experience at the Tevatron and RHIC in enabling rapid LHC commissioning. Work on the Longitudinal Density Monitor is deferred until FY05 (although an earlier start would be very advantageous). Beam commissioning and accelerator physics budget of \$227k will support a graduate student at Fermilab to work on the long term prospects for active beam-beam compensation by wires or electron lenses, and 0.7 FTE scientist between BNL and LBNL.



to work on initial planning for beam commissioning, IR upgrade studies, and other topics. The budget of \$111k is provided for planning for commissioning the US-provided hardware for LHC, which is scheduled to begin in FY2005, and will support 0.5 FTE scientists and engineers spread across the three labs.

The magnet R&D budget is \$325k, spread roughly equally among the three labs. It will provide for initial design studies on dipoles and quadrupoles for the LHC IR upgrade. A substantial fraction of the effort is related to issues for the dipoles: heat transfer in a high heat load environment and mechanical analysis of several candidate designs, particularly the split mid-plane design. This work is supported by a test on a sub-scale magnet to compare calculations with magnet performance. Cabling work for keystone cables and extracted strand measurements are planned to support the magnet design studies and sub-scale test. We also want to start design studies on quadrupole mechanical support structures. This work will be heavily leveraged off of the base high-field magnet R&D programs.

The instrumentation and magnet R&D programs are marginally supported with the small FY2004 budget. The levels of support that we feel are necessary for these programs to make serious progress are indicated in our (draft) proposal for an enhanced program. The figures shown in the third column of the table are from that proposal. The \$445k increase in accelerator systems allows more than a doubling of the effort on tune measurement and feedback, to the level of 1 FTE each at BNL and FNAL. Such an effort level would allow serious progress to be made on this task which is both critical to the performance of LHC and which has strong synergies with the Tevatron and RHIC programs. This funding level also allows work on the longitudinal density monitor to begin in FY2004, and put it on track for implementation within the first year of LHC operation, rather than the second. The additional \$275k for magnet R&D would allow at least one additional sub-scale magnet test, and provide for a more thorough and broad early study of magnet critical design parameters and technology choices, laying a more solid basis for the model magnet program that is planned to begin in FY2005.

The middle column shows an intermediate case, in which an additional \$200k is available. We would concentrate the additional resources on the tune feedback research, and magnet R&D. Effort on tune feedback would be about 50% above that allowed by the \$1050k funding level, allowing us to have serious impact on the development of this important system. However, work on the longitudinal density monitor would still have to wait until FY2005. The magnet R&D budget would be increased by about 40%, which would provide for a more thorough and broad early study of magnet critical design parameters and technology choices, than is possible at the \$1050k funding level, laying a more solid basis for the model magnet program that is planned to begin in FY2005.

Please let me know if you need additional information.

Cheers,
Jim